

REMARKS UPON SPATIAL RELATIONSHIPS IN ENTOMOLOGICAL DESCRIPTION.

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ANTERIOR AND POSTERIOR VS. CEPHALIC AND CAUDAL.

Of late years (since the publication of MacGillivray's *External Insect Anatomy*, 1923) there has been considerable use of the terms *cephalic* and *caudal* in a purely directional sense, that more often expressed by the terms *anterior* and *posterior*. It seems to the writer that something should be said against it. In the first place, as long as we know which end of an insect is forward, the old terms serve quite adequately. If there be any doubt as to which end is forward the matter can be settled better by definition than by the use of another term. From another viewpoint, the derivation from the Greek work for head (*kephalon*) and the Latin word for tail (*cauda*) produces a confusing association with these parts. Some authors refer to "cephalic femur," "caudal tibia," etc., as if there were legs attached to the head or tail, whatever the latter may be. When aphidologists refer to caudal structures they mean structures connected with a part of the abdomen that has for a long time borne the designation "cauda," and which is important taxonomically. Extrapolation of the meaning of the adverbial expressions formed with the suffix *-ad* (from Latin *ad*, meaning "to, toward, in the direction of") results for example in such expressions as "maxilla developed as a lobe extending far cephalad of the head." An author also writes of the "caudal end" of the fourth article of a posterior appendage; here "apical" or "distal" would be better, since the "caudal end" of an antennal article would be just the opposite.

Illustrative of the superfluity and dissatisfaction (conscious or otherwise) which authors find in the use of these terms is the lack of consistency in their application. The following examples, selected at random in a couple hours, will make the point plain.

a) In 1944 a description appeared wherein an appendage is said to be "inclined *cephalad* and *mesad*, the *anterior* margin slightly concave."

b) Another author describes an insect as having the vertex of the head "narrow at *caudomesal* angle of eyes, expanded *anteriorly* and with an unusually broad strip extending *caudad* of eyes, *anterior* margin varyingly produced," etc., and in the next sentence "pronotum . . . broadened *posteriorly*." Would "caudally" in the latter instance mean "in the manner of a tail"?

c) A third author states in one paragraph "female last ventral segment with *posterior* margin . . . excavated" and "dorsal portion (of aedeagus) with process directed ventrally and *caudally*." The present writer in the latter case would prefer "posteroventrally."

d) A fourth author mentions "*anterior* side of femora," "*posterior* dorsocentral bristles," "*anterior* tarsus," and "*hind* basitarsus" but in the same paper has "male genitalia . . . strongly developed *cephalad* and *caudad*" and "*caudal* margins of (abdominal) segments."

THE PLANE OF BILATERAL SYMMETRY.

The choice of *medial*, *median*, *mid-*, *middle* and *mesal* in reference to the plane of bilateral symmetry seems to be a personal matter, although usage is predominantly in favor of "median" as an adjective and just as predominantly in favor of "medially" as the corresponding adverb. A few writers follow the dictionaries in using "medianly" as the adverbial form of "median." It would seem that the crux of the matter lies in recognizing "median" as referring only to the "median plane of symmetry," and using "medial" in other situations, as for example when referring to a band of color in the middle of a tibia as a "medial band" or when referring to the media vein of the wings, although in each case the term is derived from the same Latin word, *medius*.

Meson (Greek, neuter of *mesos* "middle") is a term which has the advantage of distinctness of form as well as providing a simple substantive (noun) for the concept of "plane of bilateral symmetry." From it are derived the adjective *mesal* and the combining form *meso-*. "Mid-line" or plain "middle" is also frequently used in the same sense, which would be all right were it not that a transverse band, carina, etc., could also lie in the middle of a part which is also bisected by the plane of symmetry, as a tergite. The middle one of the series of three thoracic somites and appendages, however, is also designated by the prefix *meso-* (mesothorax, mesonotum, mesotibia, mesepisternum, mesoleg (!), etc.).

Ectal, *ectad*, *ecto-* are sometimes used in referring to a direction away from the plane of symmetry, although *ecto-* is used in such well-known terms as ectoderm, ectoparasite, etc., in the sense of "outside." *Lateral* and *laterad* with the combining form *latero-* unambiguously refer to a direction away from the plane of symmetry.

A resume of the terms used for spatial relationships may be helpful:

- Front, fore, forward, before, ante-, anterior, antero-, pre-, pro-, cephalic, cephalo-.
- Back, backward, hind, behind, after, rear, post-, posterior, postero-, re-, retro-, caudal, caudo-, meta-.
- Top, up, upward, above, over, on, dorsal, dorso-, supra, super-, superior, hyper-, epi-, ana-.
- Bottom, down, downward, under, below, infra-, inferior, sub-, ventral, ventro-, de-, hypo-, kata-, cata-.
- Side, sideward, sidewise, beside, lateral, latero-, pleural, pleuro-, para- (see also Out).
- Center, central, centro-.
- Middle, mid-, medial, median, medio-, meson, mesal, meso-, mes-.
- In, inward, inside, between, inter-, intra-, intro-, interior, in-, endo-, ento-.
- Out, outward, outside, away, extra-, extero-, extro-, exterior, ex-, e-, exo-, ectal, ecto-, ect-, ec-, apo-.
- Base, basal, basi-, proximal, proximo-.
- Tip, point, end, apex, apical, apico-, distal, disto-, telo-, acro-.
- Across, through, trans-, per-.
- Around, circum-, peri-.

A METHOD FOR PERMANENTLY REDUCING THE NUMBER OF BLOWFLIES IN SCREENED HOUSES.

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Invaluable as are fly-screens for keeping many undesirable insect visitors out of houses, they are somewhat ineffective for the exclusion of Blowflies (*Calliphoridae*). Furthermore, they have the undesirable attribute of retaining in the house such of these flies as do gain access to it despite their presence on doors and windows.

Towards sundown, particularly when the nights are inclined to be cool, blowflies have the habit of squeezing themselves into surprisingly small cracks and crevices, such as those around the outer edges of fly-screens, around doors, through badly fitted eaves, &c. Owing to this habit many of them, ultimately, find their way into the house.

Sooner or later, however, their positive phototactic responses will bring all of them to the windows where, even though the latter are open, the screens prevent their escape. On their arrival on the screens it can now be seen that, in addition to their phototactic responses, they are definitely negatively geotactic when walking.